1985 ANNUAL REPORT

The Coordinating Committee of Maritime Electric Utilities

presented to

The Council of Maritime Premiers

Maritime Electric Company, Limited

New Brunswick Power

Nova Scotia Power Corporation

THE COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

1985 ANNUAL REPORT

TO

THE COUNCIL OF MARITIME PREMIERS

03758

May 8, 1986

Premier J.M. Buchanan
Premier R.B. Hatfield
Premier J.A. Ghiz

Sirs:

It is with pleasure that we, the members of the Co-ordinating Committee of Maritime Electric Utilities, submit our Annual Report.

The Co-ordinating Committee of Maritime Electric Utilities (CCMEU), having now completed its fifth full year of operation, feels that its existence has helped to promote and ensure full co-operation among the region's electric power utilities.

We also believe that CCMEU serves a useful role in identifying, discussing, and quantifying the benefits of such co-ordination for the Council of Maritime Premiers.

Respectfully,

D.G. Brown
Chairman, CCMEU
Nova Scotia Power Corporation

J.H. Reynolds
Secretary, CCMEU
Maritime Electric Company Limited

G.L. Titus
Member, CCMEU
New Brunswick Power

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1.0 SUMMARY OF FINDINGS

1.1 General

The committee feels that the terms of reference provided by the Council continue to be satisfactory and will result in the ability to provide valuable information to both the Council and the Utilities in matters relating to the efficient regional development and operation of the Maritime Electric Power Systems.

The individual Operating, Planning, and Research and Development Subcommittee reports provide an overall appreciation of Committee results.

Highlights from these subcommittee reports reveal the following:

1.2 Regional Operating Subcommittee Report

The interconnected operation of the power systems of the three member utilities resulted in improved reliability of service to customers and lower power costs. A record 1.5 billion kW.h of electrical energy worth 52.5 million dollars was exchanged during 1985. The benefit to the three utilities as a result of the exchange totals 26.4 million dollars, up one million dollars from the previous year. This figure does not include the benefits resulting from the joint ownership of Dalhousie Unit No. 2 by N.B. Power and Maritime Electric (PEI) Limited.

Activities were ongoing in the coordination of generation maintenance scheduling plans and transmission system maintenance to ensure the continued realization of the economies of operation and improved reliability which this provides.

Progress was made during the year in the Subcommittee's efforts to determine the best overall utilization of existing electrical energy resources in the region.

1.3 Regional Planning Subcommittee Report

The report summarizes the regional load forecast, load-resources review and generation expansion analysis carried out over the past year for the Maritime Utilities.

The load forecast is based on the forecast of the individual utilities. The past year has seen a strong growth in domestic and industrial sales both at 7.7%. Commercial sales have been more moderate at 4.3%. Total sales have grown 6.7% over the past year. Average annual growth rates over the years 1985/86 to 2000/2001 are expected to be 3.2% for energy and 3.3% for peak demand.

The Load-Resources Review indicates that, from a generation reliability viewpoint, there is an adequate level of generation reserves in the Maritime Provinces until the mid-1990's.

Work is continuing on the development of generation expansion alternatives for the region. While some general trends are beginning to emerge, more analysis is required before detailed conclusions can be made relative to the proper timing and mix of generating sources required to meet the growing electrical needs appropriate to the three Maritime Provinces on a combined basis.

1.4 Regional Research and Development Subcommittee Report

The subcommittee is pleased to report a continuing increase and improvement in co-operative activity in which the benefits of Research and Development in the Maritime Electric Utilities are being shared among member utilities.

The main areas of R & D in the region related to the following:

- reduction in acid-forming gas emissions
- load research information
- preventive maintenance
- alternative fuels for oil-fired plants
- research into new energy markets

A review of current R & D activity reveals the following projects in each utility:

1.4.1 New Brunswick Power

- Circulating fluidized bed demonstration project
- Distributed mixing coal burner development
- Chatham coal-water mixture demonstration
- OX-CE fuel demonstration at the Chatham generating station
- NRC atomizer demonstration at the Chatham generating station
- Leak detection in feedwater heaters
- Coal wash project
- Development of an on-line performance monitoring system
- Retrofit variable-speed drive to an induced-draft fan
- Electrical testing of thermally-deteriorated converter transformer to determine remaining electrical strength
- Lightning ground flash density measurements in Canada
- Review of current and scheduled R & D in HVDC - Position Paper
- Seminar on transmission line audible noise
- State-of-the-art study on electron and particle beam devices
- Power system harmonics - a review and assessment of problems
- Survey of Canadian electrical inspection authorities re service entrance upgrading practices
- High temperature industrial heat pump laboratory
- Fish culture facility utilizing waste heat from the Mactaquac generating station
- Fish passage facilities

- Utilization of thermal station cooling water for hatchery aquaculture
- Waste heat utilization - surface heated greenhouse

1.4.2 Nova Scotia Power Corporation

- Accelerated material evaluation of polymer insulators for transmission lines
- Annapolis tidal project
- Atmospheric fluidized bed studies
- Circulating fluidized bed feasibility study
- Coal-liquid mxitures
- Control of distribution line galloping
- Development of a one-ton line service truck body
- Feasibility evaluation of large-scale heat pumps
- Field testing of distribution equipment and line materials in a marine atmosphere
- Marginal cost-based peak load pricing and load control study
- Osprey nesting on transmission lines
- Performance of preservative-treated white and red spruce poles
- Wind generation experiment
- Application of Ion chromatography to chemical control of the steam/water cycle
- Nova Scotia add-on plenum heater experiment

1.4.3 Maritime Electric Company Limited

- Wind test site, North Cape, P.E.I.
- Coal-liquid mixture combustion - Charlottetown, P.E.I.
- Farm losses resulting from electric service interruptions
- Transmission conductor galloping

2.0 THE COMMITTEE

The membership of the Committee shall consist of one representative, and an alternate, from each of the electric utilities. Observers delegated by each Provincial Government and the Federal Government may attend Committee meetings.

2.1 Committee Membership

Mr. D.G. Brown, Chairman
Vice President - Planning
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P.O. Box 910
Halifax, Nova Scotia
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Mr. J. H. Reynolds, Secretary
President and C.E.O.
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P. O. Box 1328
Charlottetown, P.E.I.
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Mr. G. L. Titus, Member
Vice President,
Planning & Development
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2.2 Observers To The Committee

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Secretary To The Executive Council
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Dept. of Energy & Forestry
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Barry Toole
Secretary, Cabinet Committee on Policy and Priorities
Cabinet Secretariat
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E. Martin Warnes
Director Electrical Energy Technology
Electrical Energy,
Energy Commodities Sector
Energy, Mines and Resources
580 Booth Street
Ottawa, Ontario
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2.0 The Committee (cont'd)

2.3 Alternate Committee Members

F.C. MacLoon (Alt. Member)
Vice President, Engineering & Operations
New Brunswick Power
515 King Street
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P. H. Newcombe (Alt. Member)
General Manager
Maritime Electric Company Ltd.
P.O. Box 1328
Charlottetown, P.E.I.
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L.J. Sweett (Alt. Member)
Vice President - Customer Services
Nova Scotia Power Corporation
Post Office Box 910
Halifax, Nova Scotia
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2.4 Committee Terms of Reference

The responsibility, structure, and operation of the Committee is intended to ensure a continuing high degree of cooperative effort among the electric utilities of New Brunswick, Nova Scotia, and Prince Edward Island in the development and operation of an economic and efficient interconnected regional electric power system.

Responsibilities of the Committee shall include:

(1) Development of coordinated load growth forecasts on an annual basis.
(2) Identification and evaluation of regional electric utility development opportunities.
(3) Development of optimum coordinated short and long range utility expansion plans.
(4) Coordination of operations of the three utility systems with the objective of minimizing total regional generation costs, and improving security of supply.
(5) Coordination of electric energy research and development, conservation and related activities of a regional nature.
(6) Provision of a regional focus for operations coordination with neighbouring utility systems.
(7) Such matters as may be referred to the committee by the Council.

The Committee shall meet at least quarterly with locations normally rotating among the three provinces.

The Committee shall submit a written report at least annually to the Council of Maritime Premiers.

2.0 The Committee (cont'd)

2.5 Subcommittee Membership

2.5.1 Regional Operating Subcommittee

Chairman: W.V. Wallace
Nova Scotia Power Corporation

Members: P. H. Newcombe
Maritime Electric Company, Limited

W.A. Patterson
New Brunswick Power

2.5.2 Regional Planning Subcommittee

Chairman: R. W. Brown
Nova Scotia Power Corporation

Members: J. L. Boomhower
Maritime Electric Company, Limited

D. G. Hayward
New Brunswick Power

2.5.3 Regional Research and Development Subcommittee

Chairman: J. A. Lea
Maritime Electric Company, Limited

Members: J. Kiuru
Nova Scotia Power Corporation

C. T. Flynn
New Brunswick Power

1985

ANNUAL REPORT

OF THE

REGIONAL OPERATING SUBCOMMITTEE

OF THE

COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

Members:

W.V. Wallace - Chairman, NSPC
P.H. Newcombe MECL
W.A. Patterson NBPower

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3.1 EXECUTIVE SUMMARY

This is the fifth annual report of the Regional Operating Subcommittee to the Coordinating Committee of Maritime Electric Utilities and describes the Subcommittee's activities during 1985.

The interconnected operation of the power systems of the three member utilities resulted in improved reliability of service to customers and lower power costs. A record 1.5 billion kWh of electrical energy worth 52.5 million dollars was exchanged during 1985. The benefit to the three utilities as a result of the exchange totals 26.4 million dollars, up one million dollars from the previous year.

Activities were ongoing in the coordination of generation maintenance scheduling plans and transmission system maintenance to ensure the continued realization of the economies of operation and improved reliability which this provides.

Progess was made during the year in the Subcommittee's efforts to determine the best overall utilization of existing electrical energy resources in the region.

3.2 RECOMMENDATIONS

It is recommended that the Regional Operating Subcommittee continue with the proposed activities for 1986 as described in Section 3.5.

3.3 TERMS OF REFERENCE

The Regional Operating Subcommittee shall consist of at least one member from each of the utilities in the Maritime region. The Subcommittee will meet at least twice yearly and will report to the Coordinating Committee of the Maritime Electric Utilities (CCMEU) at least twice yearly.

The Regional Operating Subcommittee shall undertake to do the following:

3.3.1 Monitor and report on activities within each utility with respect to changes in control and operating policy and practice.

3.3.2 Review, at least annually, the operating policies and practices in effect in the different utilities and determine if there are benefits of integrating different operational aspects of the utilities.

3.3.3 Endeavour to determine the optimum dispatch of existing electrical energy resources on a regional basis including imports from outside the region and where beneficial, exports and report on any actions that the Subcommittee thinks could be beneficial to the utilities individually or collectively.

3.3.4 Attempt to identify and report on possible savings due to allocation of hydro on a regional basis and possible methods of sharing benefits from such allocation.

3.3.5 Submit minutes of Subcommittee meetings to the Secretary of CCMEU for distribution to CCMEU members and other Subcommittee members.

3.3.6 Submit a proposed work program and an expected budget requirement to the CCMEU by June 1 of each year.

3.4 ACHIEVEMENTS FOR 1985

3.4.1 Benefits from Interconnected Operation

The benefits of interconnected operation of the power systems of the member utilities are two-fold: improved reliability of service to customers and lower power costs.

Service is enhanced through the sharing of generation reserves which are available instantaneously or within minutes to respond to an unforeseen requirement. This could arise as a result of an unexpected load increase, sudden loss of a generating unit, loss of transmission lines during a storm, or a major equipment failure. In addition to having access to a larger reserve in the event of an emergency, the amount of reserve an individual member must maintain at any given time is reduced and therefore the cost of providing it as well.

Energy is exchanged by the member utilities on an hourly, weekly and monthly basis when the production cost of one member is greater than that of a neighbour who has a surplus at that time. The benefit of the transaction is the combination of the saving to the purchaser and the net revenue realized by the seller. The volume of these transactions in 1985 reached a record level of 1.5 billion kilowatthours and a value of 52.5 million dollars. The benefit to the three utilities, as a result of transactions totalled 26.4 million dollars, one million dollars more than that of the previous year.

INTERCONNECTION TRANSACTIONS *

for period January 1, 1985 to December 31, 1985

Energy Transactions Between	Volume of Interchange (MWh)	Total Value of Transactions ($)	Benefits of Transactions ($)
N.B. Power to N.S. Power Corp.	605,600	14,200,000	5,400,000
N.S. Power Corp. to N.B. Power	439,900	15,000,000	5,100,000
N.B. Power to Maritime Electric Co.	433,500	23,300,000	15,900,000
	1,479,000	52,500,000	26,400,000

*Benefits of Dalhousie participation agreement not included.

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3.4.2 Generation Maintenance Scheduling

Generation maintenance scheduling plans were exchanged by the members and reviewed to allow production costs to be reduced and to ensure that adequate generation reserves are maintained.

NB Power obtained the use of a portable excitation system from NSPC following the failure of the exciter on a Beechwood hydro unit during the spring runoff period.

3.4.3 Transmission System Maintenance

Personnel responsible for maintenance met during the year to provide further cooperation in the solution of maintenance problems common to the three utilities. Information on spare parts and special tools and test equipment was updated and exchanged.

The 345 kV transmission tie between Nova Scotia and New Brunswick was removed from service for the month of October for the replacement of bundled 795 kcmil conductor with single 2156 kcmil conductor, the replacement of a deadend tower with a guyed structure and the reinforcement of the remaining structures on a 9.5 km section of the line near Folly Mountain in Nova Scotia. The modifications were made to prevent reoccurence of a collapse of that elevated portion of the line due to severe icing conditions in 1984. NB Power operated the Moncton Gas Turbine as a synchronous condenser during this period to support voltages in the area.

An agreement covering emergency assistance arrangements is under review by the Subcommittee.

3.4.4 Dispatch Facilities

The Subcommittee reviewed development plans for control facilities by the member utilities to ensure compatability and identify opportunities for benefits from integration.

Maritime Electric Co. Ltd., is proceeding with the installation of a SCADA (Supervisory Control and Data Acquisition) system at the Charlottetown Control Centre. A fibre optic cable in a 138 kV phase conductor between Charlottetown and Bedeque will be utilized as the backbone communications system. Existing VHF radio will be used for other communications links.

NB Power is finalizing plans for expansion of their existing Energy Control Centre to meet essential future requirements. The modified facility will also house the distribution dispatch function. SCADA capabilities will be expanded on the present system.

NSPC has contracted for the purchase of a replacement SCADA system and is proceeding with the construction of a new Energy Control Centre in Halifax. The Centre, which will enter service in 1987, will also contain the distribution dispatch function.

The future exchange of information between the NSPC and NB Power Control Centres will be facilitated by the use of identical computers for off-line energy management functions at the two centres.

The use of control facilities of a neighbouring utility as back-up in the event of a disaster was reviewed. Each of the utilities presently relies on manual operation (voice communication, man stations as required) from a temporary nearby location as initial back-up in the event of the loss of control

facilities. Longer term back-up would be provided from a generating station or from temporary accomodations in a substation with good access to the utilities communications network. It was determined that back-up Automatic Generation Control could reasonably be provided in future by NB Power to NSPC or vice versa.

3.4.5 Optimum Dispatch of Electrical Energy Resources

The Interconnection Agreements between NB Power and Maritime Electric Co. Ltd. and between NSPC and NB Power provide for Operating Committees whose duties include among other things, all matters related to the costs associated with the interchange of energy on the respective interconnections. A Thermal Generation Working Group established by the Regional Operating Subcommittee was active during the year in developing standardized methods for determining these costs. The Group has completed work in most areas and is scheduled to make a presentation of results to the Subcommittee in the spring of 1986 followed by completion of formal documentation. It is anticipated that the standardized methods will then be approved and implemented by the individual Operating Committees.

The sharing of tie line regulation by the utilities is under review by the Subcommittee. It is anticipated that with existing Automatic Generation Control equipment it may be feasible to have one utility regulate for the entire area at a given time but not to have units from more than one utility share in the regulation. Personnel from NSPC and NB Power have been designated to prepare a feasibility report and conduct a test operation during the spring of 1986.

The steps required to determine the benefits and distribution of benefits associated with the joint dispatch of hydro were identified as follows:

1) Identify the benefits qualitatively
2) Identify the most suitable modelling tool available for the task
3) Undertake an approximate assessment of benefits
4) Undertake a detailed assessment of benefits and distribution of benefits

Because of interaction with thermal generation and external transactions the joint dispatch of hydro involves almost a full regional dispatch of electrical energy resources.

3.4.6 System Operation

The addition of two 138 kV circuits in late 1985 effectively doubled NB Power's transfer capability between Salisbury and Moncton. The Subcommittee coordinated transmission outages associated with the construction of these lines and initiated a review of special protection systems involving the three utilities as a result of the changes.

During the year training was jointly provided to system operators in the area of voltage control on interconnected systems.

3.5 Proposed Activities for 1986

3.5.1 Continue to evaluate and report on the annual benefits from interconnected operation.

3.5.2 Continue to exchange maintenance schedules of generation and major transmission facilities to enhance operating efficiency.

3.5.3 Update information exchanged on spare parts and apparatus for transmission facilities and specialized test equipment.

3.5.4 Provide joint training for system operators on Special Protection Systems (SPS).

3.5.5 Complete the objectives of the Working Group on production costs.

3.5.6 Undertake sharing of tie line regulation on a test basis.

3.5.7 Continue efforts associated with the joint dispatch of hydro.

ANNUAL REPORT

OF THE

PLANNING SUBCOMMITTEE

OF THE

COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

JANUARY 1986

Members:

R.W. Brown - Chairman, NSPC

J.L. Boomhower MECL

D.G. Hayward NB Power

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4.1 SUMMARY

This is the fifth annual report of the Planning Subcommittee to the Coordinating Committee of the Maritime Electric Utilities. The report summarizes the regional Load Forecast, Load Resource Review and Generation Expansion Analysis carried out by the subcommittee in 1985.

The Load Forecast is based on the forecast of the individual utilities. The past year has seen a strong growth in domestic and industrial sales both at 7.7%. Commercial sales have been more moderate at 4.3%. Total sales have grown 6.7% over the past year. Average annual growth rates over the years 1985/86 to 2000/2001 are expected to be 3.2% for energy and 3.3% for peak demand.

The Load-Resources Review indicates that, from a generation reliability viewpoint, there is an adequate level of generation reserves in the Maritime Provinces until the mid 1990's. The results are given in Tables 9, 10 and Figures 1 and 2.

Work is continuing on the development of generation expansion alternatives for the region. While some general trends are beginning to emerge, more analysis is required before detailed conclusions can be made relative to the proper timing and mix of generating sources required to meet the growing electrical needs appropriate to the three Maritime Provinces on a combined basis.

A brief review of regional alternatives is included.

4.2 RECOMMENDATIONS

It is recommended that the Planning Subcommittee continue with the proposed activities for 1986 as outlined in section 4.6 of this report.

4.3 TERMS OF REFERENCE

The Regional Planning Subcommittee shall consist of at least one member from each of the utilities in the Maritime Region. The Subcommittee will meet at least twice yearly and will report to the Coordinating Committee of Maritime Electric Utilities (CCMEU) at least twice yearly.

The Regional Planning Subcommittee shall, through whatever mechanism it deems necessary, Task Force appointment, consultant acquisition, etc., (subject to approval of CCMEU) undertake to do the following:

1. Prepare a load forecast showing the power and energy requirements of the region for approximately two decades. This load forecast shall be reviewed and updated, if necessary, annually.
2. Obtain the plans of the individual utilities and combine them to prepare a regional load-resource balance.
3. Identify possible benefits through short term deferral and/or advancement of provincially scheduled units and will so notify the CCMEU.
4. (a) Considering all feasible regional alternatives, prepare an optimum long term generation expansion plan (including major transmission when necessary) without regard to individual utility boundaries and without regard to proposed provincial units which have not been committed to construction. The development of any optimum expansion plan will always start with the then existing and committed facilities of the three Systems.

4.3 TERMS OF REFERENCE (Cont'd)

(b) Prepare a report comparing the optimum regional expansion plan with the sum of the individual expansion plans and report its findings to the CCMEU.

5. Periodically assess the potential for imports from outside the region or exports outside the region, the constraints imposed by existing transmission system limitations and will recommend the need or otherwise for studies of incrementing transmission capacity.

6. Submit a proposed work program and an expected budget requirement to the CCMEU by June 1 of each year.

4.4 WORK PROGRAM FOR 1985

The following is the 1985 work program as proposed in last year's Annual Report:

1. Continue the development of a long term economic regional generation expansion plan taking into consideration major transmission requirements.

2. Produce a regional load forecast.

3. Produce the load resource balance for generation existing and under construction.

4. Write a formal report(s) on the subcommittee annual activities.

4.5 ACHIEVEMENTS FOR 1985

4.5.1 Maritime Utilities Load Forecast

The individual Maritime utilities forecasts have been combined in Table 1 to give the regional load forecast. Average annual compound growth rates for the period 1985/86 to 2000/2001 are 3.2% for energy and 3.3% for net firm peak demand. The overall growth is slightly higher than last year, 1999/2000 presently forecast as 5167 MW/28085 GWh as opposed to 4827 MW/26579 GWh.

Since the individual utility annual peak loads do not necessarily all occur at the same hour of the year, their arithmetic sum is usually greater than the annual peak load demand of the integrated regional system. A projection of future hourly loads of each of the three utilities has been combined to obtain the total peak load forecast for the region. The results are shown in Table 2.

Table 3 summarizes the expected long term growth in energy sales by sector. Growth in the domestic sector has been fairly strong over the past three years. The commercial sector has seen only moderate growth. The industrial sector growth rate recovered to the pre-recession level. Overall sales increased 6.7% in 1984-85 and averaged 4.5% per year between 1981-82 and 1984-85. Between 1984/85 and 1999/2000 the forecast annual compound growth rate in total sales is 3.2%.

4.5 ACHIEVEMENTS FOR 1985

4.5.1 Maritime Utilities Load Forecast (Cont'd)

Tables 4 and 5 show respectively the regional monthly coincident peak demand and energy forecasts. It is interesting to note that the month of maximum peak demand is now January instead of December and the month of maximum energy demand continues to be January.

With all the uncertainties in the future variables which could effect the growth in electricity consumption, the forecast must be frequently updated, and can only act as a guide to utility planning.

4.5.2 Regional Load and Resources Review

The Load and Resource Review is intended to examine the ability of the regional utilities generating facilities to reliably meet the anticipated future demands of the customers.

4.5.2.1 Load Requirements

To allow for maintenance and account for forced or unexpected outages of generating units, the total generating capacity installed in the region must be greater than the regional load. This excess of generation over expected load is known as reserve. The load requirement to be met in the region consists of the forecast load in Table 1 plus a specified amount of reserve.

4.5 ACHIEVEMENTS FOR 1985

4.5.2.2 Resources

The generation resources are comprised of the total generation capabilities from both existing generating stations and those under construction. Retirement of older plant through time is also taken into consideration. Listings of the resources are given by Province in Tables 6, 7 and 8. The resources consist of a mix of hydro, coal fired thermal, oil fired thermal, gas turbine and nuclear generation.

4.5.2.3 Reserve Criteria

The present New Brunswick policy is to use two reserve criteria in the assessment of the ability of the generation to reliably serve the load. For the purpose of this regional examination, these criteria have been applied to the combined NB, NS and PEI systems.

4.5.2.3.1 Reserve Criterion for Peak Electrical Capability

The power reserve criterion for Peak Electrical capability requires that the total generating capacity available in each month be able to supply the load during the peak hour of the month with a surplus equal to 20% of the forecast firm load or the capacity of the largest unit, whichever is larger. To meet

4.5.2.3.1 Reserve Criterion for Peak Electrical Capability (Cont'd)

this criterion thermal and hydro generating units are considered available at their full rated capabilities.

4.5.2.3.2 Reserve Criterion for Sustained Electrical Capability

The reserve criterion for sustained electrical capability requires that the NB, NS and PEI systems jointly be able to withstand the continuous loss of the largest unit in the interconnected area. Because of the 230 MW of participation sales from the Point Lepreau nuclear unit, a unit loading of 405 MW will be relied upon within the New Brunswick system from that unit.

4.5.2.4 Solution Procedure

A comparison is made between the generation resources and the load required for each month of the study period. A surplus or deficit in the capability to supply is determined on both the reserve for the peak electrical capability and the reserve for the sustained electrical capability.

4.5 ACHIEVEMENTS FOR 1985

4.5.2.4.1 Peak Electrical Capability Assessment

The required reserve for peak capability is added to the peak forecast load to determine the total peak load that would have to be met. This total load is compared with the sum of the generation supplies available from hydro, nuclear and fossil units to determine the surplus or deficit. In doing this calculation all generating units are considered to be available at their full net rated capability as given in Tables 6, 7 and 8. The results of this assessment are presented in Table 9, and Figure 1.

4.5.2.4.2 Sustained Electrical Capability Assessment

Assessment of the sustained electrical capability of the system examines the ability of the generation to meet, during every hour of each month, the forecast load plus the required sustained reserve. For this assessment nuclear and fossil units are assumed available at full rated capacity 100% of the time.

Low water conditions are utilized in determining the hydro contribution to sustained electrical capability.

4.5.2.4.2 Sustained Electrical Capability Assessment (Cont'd)

The available storage water is regulated in a manner to maximize the benefits on the system. The results of the sustained electrical capability assessment are given in Table 10 and Figure 2.

The load resource balance of the NB, NS and PEI systems has been carried out for each month of the year. This report provides only details of the peak load month in each year, since this condition has been used to define the system surpluses and deficiencies and hence indicates from a reliability viewpoint when new generation is required.

For the purposes of determination of both the peak and sustained reserve capabilities the largest unit in the region is as follows:

1. Until 1991/92 - Point Lepreau at 405 MW
2. After 1991/92 - Point Lepreau at 635 MW

4.5 ACHIEVEMENTS FOR 1985

4.5.3 Regional Generation Alternatives

Expansion planning to date has considered the regional economic implications of a coal generation expansion plan, a nuclear generation expansion plan and a combined coal/nuclear plan as well as the individual utility plans.

Work has begun on the development of a single long-term regional generation expansion plan. Preliminary information has been gathered to enable the modeling of the transmission network. The policies of the three Provincial Governments with respect to the utilization of any of the above mentioned generating sources must be considered in terms of future planning. Suffice to say, however, that at this point substantially more work is required before any conclusion can be made.

4.5.3.1 Conventional Hydro

A potential development exists at Green River for a pumped storage project with an annual energy capability of 130 GWh from two 80 MW units. The development, as proposed, would operate as a seasonal storage. Water stored during the spring would be released during the low flow, high system electrical demand periods. The development would also operate year round as a daily cycle pump storage facility whereby the units would generate power during the peak load hours of the day. The water released during this generation would be pumped back from the lower reservoir during the night.

4.5.3.1 Conventional Hydro (Cont'd)

A potential for redevelopment exists at Grand Falls where an additional 300 MW could be developed to produce up to 655 GWh annually.

Other potential developments exist at the Morrill site with an installed capacity of approximately 140 MW and the existing Tobique Plant where pumped storage operation could be utilized. Other possible new hydro generation and storage sites exist throughout New Brunswick.

In Nova Scotia there are no major hydro projects left to be developed but there are several potential small developments.

There are no potential hydro sites in PEI.

4.5.3.2 Tidal

There are two tidal projects which continue to exhibit some potential of becoming economically viable. Site B9 across the mouth of Cobequid Bay has a potential capacity of 5000 MW and A8 across the Cumberland Basin has a potential capacity of 1400 MW. Both sites are large with respect to the region, are economically dependent on substantial export and have a minimum 10 year engineering and construction lead time.

4.5 ACHIEVEMENTS FOR 1985

4.5.3.3 Nuclear

Nuclear power is potentially an economically acceptable base load option. It is one consideration in the development of an appropriate long range regional generation expansion plan.

4.5.3.4 Natural Gas

This is not currently available to the region and should it become available it would likely only be to provide a short term market for gas by burning it in units such as Coleson Cove, Courtenay Bay or Tufts Cove.

4.5.3.5 Coal

Coal power is potentially economic and financially attractive for the region in both new units and in the conversion of existing oil-fired units. Nova Scotia is presently converting a 150 MW oil-fired unit at Point Tupper to coal and New Brunswick is studying the conversion of Coleson Cove from oil to coal-firing. Both Nova Scotia and New Brunswick are examining the potential for new coal-fired units. Several projects have been undertaken to investigate the feasibility of burning coal more economically and cleanly through the use of technologies such as coal-water mixtures and fluidized bed combustion. The large reserves of indigenous coal resources makes these options particularly important to investigate.

4.5 ACHIEVEMENTS FOR 1985

4.5.3.6 Load Management

In this document load management refers to efforts to manage customer load by action initiated by the utilities to move consumption from peak to off-peak periods. The large amount of peak shaving capability provided by the regions' hydro resources tends to minimize the advantage of load management. However, it continues to be investigated.

4.5.3.7 Conservation

The need for energy conservation continues to be a major concern of the Maritime Utilities and all practical forms of conservation are considered such as incentive programs and educational programs.

4.5.3.8 Other

Alternate energy sources such as wood, biomoss, solar, wind, fuel cells, etc. have been investigated as generation sources but, to date, have not been shown to be economically attractive.

4.6 PROPOSED ACTIVITIES FOR 1986

The activities proposed for 1986 are a continuation of the present work:

1. Continue the development of an appropriate long term economic regional generation expansion plan taking into consideration potential generation alternatives and major transmission requirements.

2. Produce a regional load forecast.

3. Produce the load resource balance for generation existing and under construction.

4. Address additional requests of the Coordinating Committee as required.

5. Write a formal report(s) on the subcommittee annual activites.

TABLE 1

MARITIME ELECTRIC UTILITIES

LOAD FORECAST

Fiscal Year	System Net Gwh*	Peak Hourly MW
1985-86	18093	3281
86-87	18861	3430
87-88	19577	3586
88-89	20343	3727
89-90	21024	3856
90-91	21705	3979
91-92	22383	4105
92-93	23050	4235
93-94	23749	4362
94-95	24419	4487
95-96	25173	4627
96-97	25874	4756
97-98	26587	4890
98-99	27327	5026
99-00	28085	5167
00-01	28859	5313

Total Period Averge Annual Growth Rate:

Gwh = 3.2%

MW = 3.3%

* Includes System Losses

TABLE 2

MARITIME ELECTRIC UTILITIES

COINCIDENT PEAK LOAD FORECAST (MW)

FISCAL YEAR	N.B.	N.S.	P.E.I.	TOTAL	REGIONAL DIVERSITY	REGIONAL LOAD
1985-86	1911	1278	97	3286	5	3281
86-87	2006	1336	100	3442	12	3430
87-88	2102	1389	104	3595	9	3586
88-89	2180	1451	108	3739	12	3727
89-90	2246	1514	112	3872	16	3856
90-91	2310	1577	116	4003	24	3979
91-92	2374	1638	119	4131	26	4105
92-93	2436	1700	123	4259	24	4235
93-94	2495	1768	127	4390	28	4362
94-95	2549	1837	131	4517	30	4487
95-96	2616	1907	135	4658	31	4627
96-97	2669	1979	139	4787	31	4756
97-98	2723	2054	143	4920	30	4890
98-99	2778	2133	147	5058	32	5026
99-00	2834	2214	151	5199	32	5167
00-01	2891	2298	155	5344	31	5313
Average Annual Compound Growth Rate %	2.8	4.0	3.2			3.3

TABLE 3

MARITIME ELECTRIC UTILITIES

1985 LOAD FORECAST SUMMARY

(GWH)

FISCAL YEAR	DOMESTIC	COMMERCIAL	INDUSTRIAL	TOTAL
81-82	4226	3977	5679	13882
82-83	4416	4042	4988	13446
%	4.5	1.6	-12.2	-3.1
83-84	4791	4195	5871	14857
%	8.5	3.8	17.7	10.5
84-85	5159	4376	6323	15858
%	7.7	4.3	7.7	6.7
89-00	8736	7147	9413	25296
%	3.6	3.3	2.7	3.2

% are per annum

TABLE 4

MARITIME ELECTRIC UTILITIES

MONTHLY COINCIDENT PEAK DEMAND FORECAST (MW)

FISCAL YEAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
85/86	2719	2577	2390	2280	2332	2395	2588	2905	3187	3281	3181	3039
86/87	2842	2678	2478	2357	2411	2484	2697	3028	3340	3430	3324	3179
87/88	2967	2782	2570	2441	2495	2579	2809	3150	3491	3586	3476	3328
88/89	3085	2879	2656	2520	2575	2667	2914	3266	3634	3727	3611	3460
89/90	3193	2975	2743	2599	2657	2755	3012	3376	3765	3856	3735	3582
90/91	3302	3070	2830	2679	2738	2842	3112	3486	3896	3979	3855	3700
91/92	3408	3161	2914	2756	2818	2928	3208	3591	4022	4105	3976	3820
92/93	3514	3255	2999	2837	2899	3015	3305	3700	4149	4235	4102	3944
93/94	3624	3352	3089	2920	2984	3105	3407	3812	4281	4362	4227	4065
94/95	3730	3447	3180	3003	3069	3195	3506	3921	4408	4487	4347	4185
95/96	3852	3557	3281	3100	3166	3297	3617	4045	4551	4627	4484	4319
96/97	3961	3655	3374	3186	3254	3391	3719	4157	4680	4756	4610	4442
97/98	4075	3759	3470	3277	3348	3487	3825	4275	4815	4890	4740	4570
98/99	4193	3865	3571	3372	3443	3589	3935	4396	4955	5026	4873	4700
99/00	4314	3975	3674	3469	3542	3692	4046	4520	5097	5167	5011	4836
00/01	4437	4088	3779	3569	3644	3798	4161	4649	5243	5313	5150	4975

TABLE 5

MARITIME ELECTRIC UTILITIES

MONTHLY ENERGY FORECAST (GWH)

FISCAL YEAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
85/86	1513	1414	1310	1263	1327	1274	1446	1553	1729	1870	1672	1722
86/87	1580	1467	1358	1307	1371	1323	1506	1616	1810	1962	1753	1801
87/88	1642	1517	1400	1348	1413	1367	1560	1676	1886	2049	1830	1889
88/89	1711	1572	1451	1395	1462	1418	1621	1740	1968	2133	1903	1969
89/90	1771	1624	1496	1438	1507	1464	1675	1799	2040	2205	1967	2038
90/91	1830	1675	1542	1482	1552	1510	1730	1856	2112	2278	2031	2107
91/92	1891	1725	1589	1527	1598	1557	1785	1915	2182	2347	2094	2173
92/93	1948	1774	1633	1569	1642	1601	1837	1970	2250	2421	2161	2244
93/94	2009	1827	1681	1616	1690	1650	1893	2031	2323	2494	2224	2311
94/95	2068	1878	1727	1662	1737	1697	1946	2087	2390	2564	2286	2377
95/96	2133	1934	1780	1713	1790	1749	2006	2151	2466	2642	2357	2452
96/97	2193	1988	1828	1760	1838	1799	2063	2210	2536	2716	2422	2521
97/98	2254	2043	1879	1809	1889	1848	2119	2270	2607	2789	2488	2592
98/99	2318	2098	1931	1860	1941	1901	2178	2333	2682	2865	2556	2664
99/00	2383	2157	1984	1911	1994	1953	2239	2397	2758	2944	2626	2739
00/01	2449	2215	2038	1965	2050	2008	2300	2463	2836	3023	2697	2815

TABLE 6

GENERATING STATION CAPABILITIES - NET MEGAWATTS[1] (MW)
EXISTING AND UNDER CONSTRUCTION
IN NEW BRUNSWICK

Hydro			Thermal		
Mactaquac	1	110	Grand Lake		
	2	110			
	3	110		5	5
	4	116		6	5
	5	113		7	15
	6	113		8	57
Beechwood	1	36	Chatham	1	9
	2	36		2	20
	3	41			
			Courtenay Bay	1	45
Tobique	1	10		2	12
	2	10		3	99
				4	99
Grand Falls	1	15			
	2	15	Dalhousie	1	102
	3	15		2	183 [2]
	4	15			
			Coleson Cove	1	335 [4]
Milltown		4		2	310 [3]
				3	335 [4]
Sisson		9			
			Lepreau Nuclear	1	635 [5]
Musquash		5			
			Moncton	1	22
			Grand Manan		3
Total Hydro		883 MW	Total Thermal		2291 MW

1 Net megawatt values are derived by subtracting station service requirements from Gross Megawatt Capability.

2 Dalhousie unit 2 capability is reduced by 20 MW to recognize the joint ownership arrangement with Maritime Electric of Prince Edward Island.

3 Coleson Cove Unit 2 available at 184 MW until November, 1985 and 310 MW thereafter because of participation sales.

4 Coleson Cove units 1 and 3 available at 198 MW each until November, 1985 and 335 MW thereafter because of participation sales.

5 Lepreau Nuclear available at 405 MW until Nov. 1, 1991 because of participation sales.

TABLE 7

GENERATING STATION CAPABILITIES - NET MW
EXISTING AND UNDER CONSTRUCTION
IN NOVA SCOTIA

HYDRO	MW	THERMAL	MW
Annapolis Tidal	17[1]	Glace Bay	75
Avon	7	Lingan 1	152
Bear River	36	Lingan 2	154
Black River	20	Lingan 3	151
Dickie Brook	2	Lingan 4	151
Harmony	1	Point Tupper 2	152[2]
Lequille	22	Trenton L.P.	40
Mersey	44	Trenton 5	144
Roseway	1	Tufts Cove 1	83
St. Margarets	10	Tufts Cove 2	98
Sheet Harbour	10	Tufts Cove 3	153
Tusket	3	Maccan	13
Wreck Cove	223	Combustion Turbines	205
TOTAL HYDRO	379	TOTAL THERMAL	1571

1 The 17 MW Annapolis Tidal unit is not included as firm capacity because of the cyclic nature of the tide.

2 Point Tupper #2 is being converted to coal and will be available in 1987 12 01.

TABLE 8

GENERATING STATION CAPABILITIES - NET MW
IN PRINCE EDWARD ISLAND

THERMAL	MW
Charlottetown	19.0
	19.0
	9.5
	7.2
	7.2
	3.8
	1.4
Borden	22.0
	12.8
Summerside	10.1
Dalhousie 2 (NBEPC Purchase)	20.0
TOTAL	132.0

TABLE 9

MARITIME ELECTRIC UTILITIES

LOAD & RESOURCE REVIEW

** PEAK ELECTRICAL CAPABILITY CRITERION **

(PEAK LOAD MONTH)

FISCAL YEAR APR/MAR	FORECAST LOAD MW	REQ'D RESERVE MW	TOTAL LOAD MW	THERMAL CAP MW	HYDRO CAP MW	GROSS NUCLEAR CAP MW	NUCLEAR PART.OR FUEL REPL MW	NET NUCLEAR CAP MW	TOTAL RESOURCE MW	SURPLUS/ DEFICIT MW
1985/1986	3281.	648.	3929.	3208.	1263.	635.	230.	405.	4876.	947.
1986/1987	3430.	678.	4108.	3208.	1263.	635.	230.	405.	4876.	768.
1987/1988	3586.	709.	4295.	3360.	1263.	635.	230.	405.	5028.	733.
1988/1989	3727.	737.	4464.	3360.	1263.	635.	230.	405.	5028.	564.
1989/1990	3856.	763.	4619.	3360.	1263.	635.	230.	405.	5028.	409.
1990/1991	3979.	787.	4766.	3360.	1263.	635.	230.	405.	5028.	262.
1991/1992	4105.	813.	4918.	3360.	1263.	635.	0.	635.	5258.	340.
1992/1993	4235.	839.	5074.	3360.	1263.	635.	0.	635.	5258.	184.
1993/1994	4362.	864.	5226.	3360.	1263.	635.	0.	635.	5258.	32.
1994/1995	4487.	889.	5376.	3360.	1263.	635.	0.	635.	5258.	-118.
1995/1996	4627.	917.	5544.	3360.	1263.	635.	0.	635.	5258.	-286.
1996/1997	4756.	943.	5699.	3360.	1263.	635.	0.	635.	5258.	-441.
1997/1998	4890.	970.	5860.	3360.	1263.	635.	0.	635.	5258.	-602.
1998/1999	5026.	997.	6023.	3360.	1263.	635.	0.	635.	5258.	-765.
1999/2000	5167.	1025.	6192.	3360.	1263.	635.	0.	635.	5258.	-934.
2000/2001	5313.	1054.	6367.	3360.	1263.	635.	0.	635.	5258.	-1109.

TABLE 10

MARITIME ELECTRIC UTILITIES

LOAD & RESOURCE REVIEW

** SUSTAINED ELECTRICAL CAPABILITY CRITERION **

(PEAK LOAD MONTH)

FISCAL YEAR APR/MAR	FORECAST LOAD MW	REQ'D RESERVE MW	TOTAL LOAD MW	THERMAL CAP MW	HYDRO CAP MW	GROSS NUCLEAR CAP MW	NUCLEAR PART.OR FUEL REPL MW	NET NUCLEAR CAP MW	TOTAL RESOURCE MW	SURPLUS/ DEFICIT MW
1985/1986	3281.	405.	3686.	3208.	839.	635.	230.	405.	4452.	766.
1986/1987	3430.	405.	3835.	3208.	855.	635.	230.	405.	4468.	633.
1987/1988	3586.	405.	3991.	3360.	877.	635.	230.	405.	4642.	651.
1988/1989	3727.	405.	4132.	3360.	894.	635.	230.	405.	4659.	527.
1989/1990	3856.	405.	4261.	3360.	913.	635.	230.	405.	4678.	417.
1990/1991	3979.	405.	4384.	3360.	926.	635.	230.	405.	4691.	307.
1991/1992	4105.	635.	4740.	3360.	944.	635.	0.	635.	4939.	199.
1992/1993	4235.	635.	4870.	3360.	960.	635.	0.	635.	4955.	85.
1993/1994	4362.	635.	4997.	3360.	976.	635.	0.	635.	4971.	-26.
1994/1995	4487.	635.	5122.	3360.	992.	635.	0.	635.	4987.	-135.
1995/1996	4627.	635.	5262.	3360.	1009.	635.	0.	635.	5004.	-258.
1996/1997	4756.	635.	5391.	3360.	1024.	635.	0.	635.	5019.	-372.
1997/1998	4890.	635.	5525.	3360.	1041.	635.	0.	635.	5036.	-489.
1998/1999	5026.	635.	5661.	3360.	1058.	635.	0.	635.	5053.	-608.
1999/2000	5167.	635.	5802.	3360.	1074.	635.	0.	635.	5069.	-733.
2000/2001	5313.	635.	5948.	3360.	1094.	635.	0.	635.	5089.	-859.

MARITIME ELECTRIC UTILITIES
LOAD AND RESOURCES REVIEW
FOR PEAK LOAD MONTH
PEAK ELECTRICAL CAPABILITY CRITERION

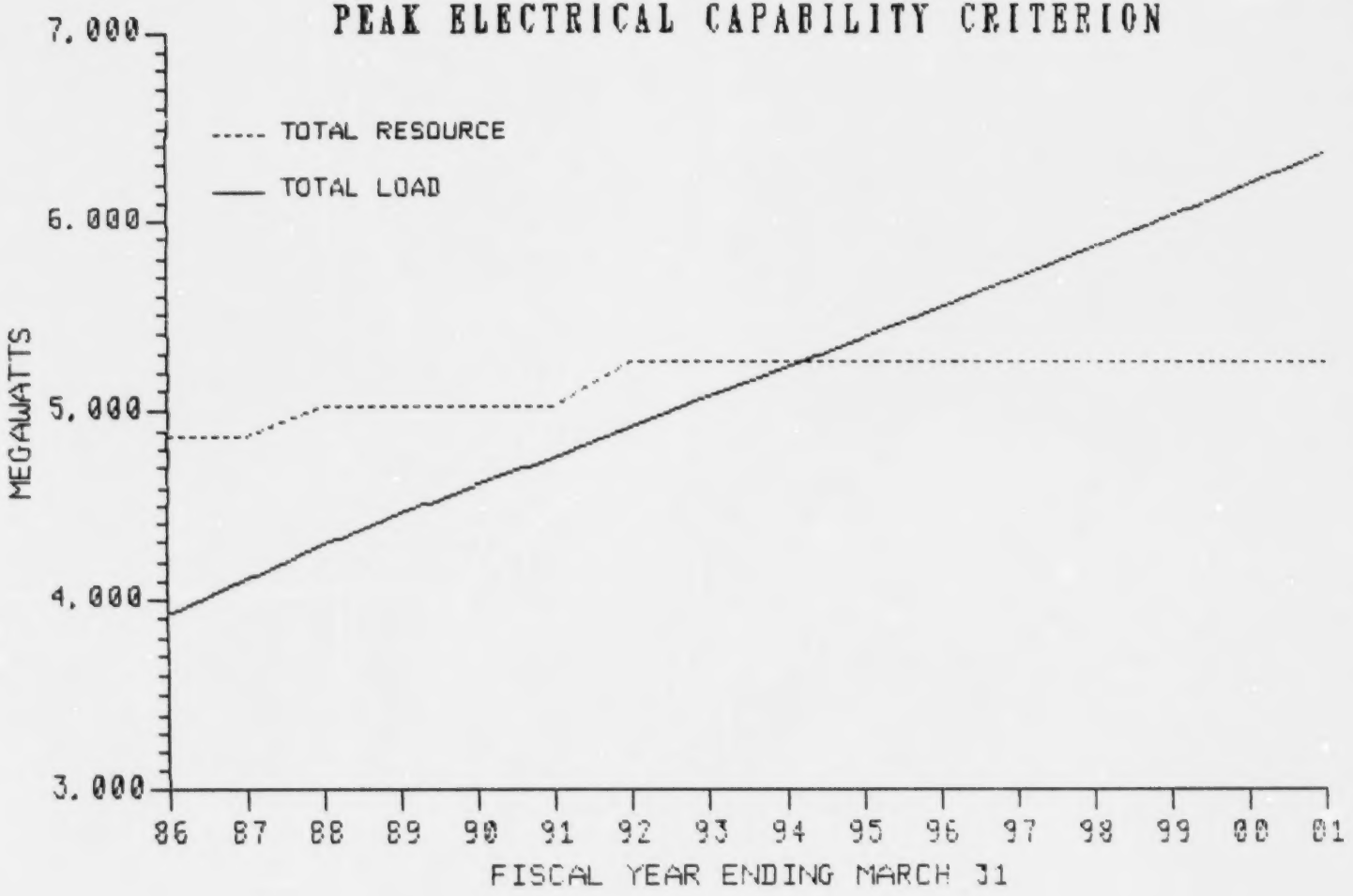

FIGURE I

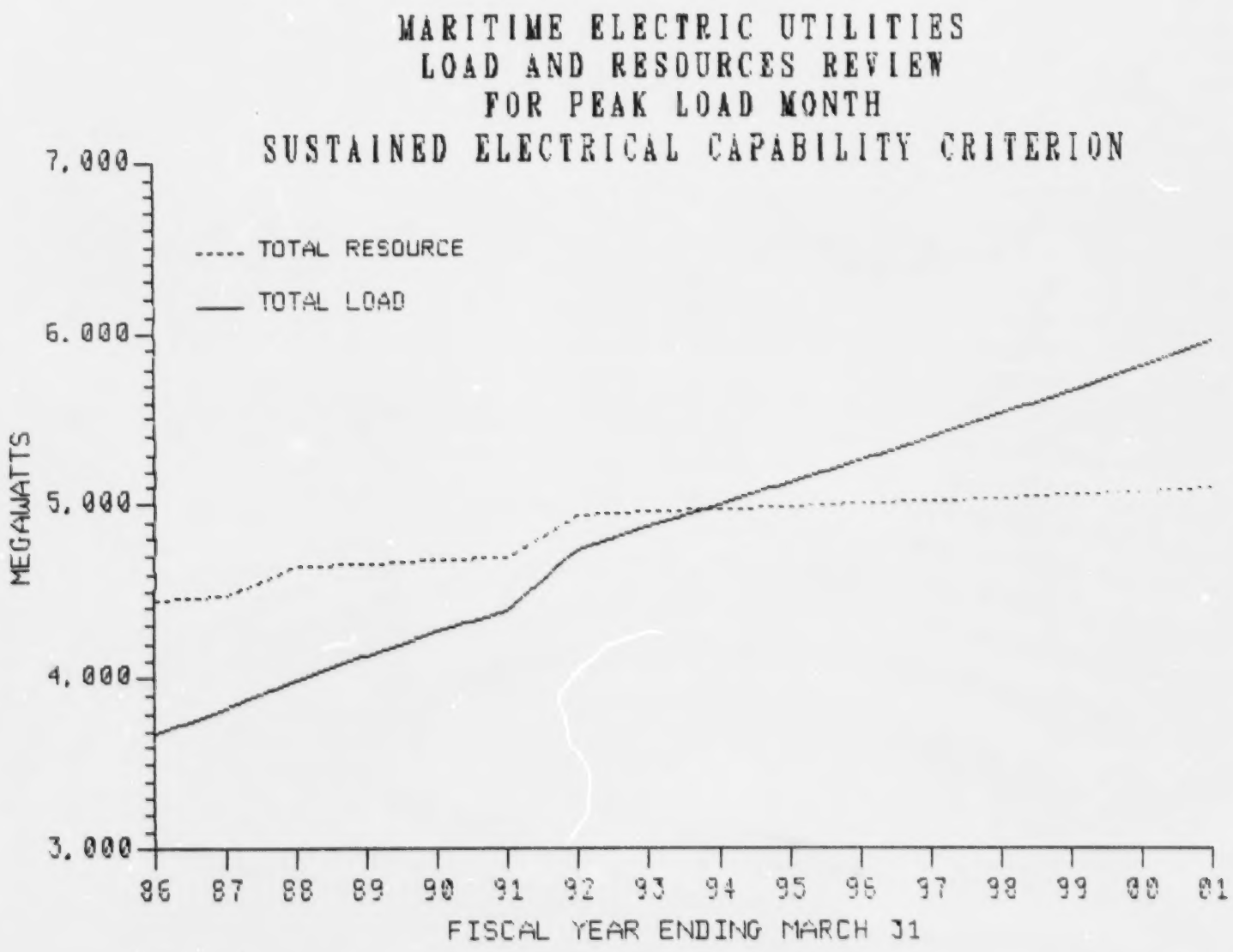
MARITIME ELECTRIC UTILITIES
LOAD AND RESOURCES REVIEW
FOR PEAK LOAD MONTH
SUSTAINED ELECTRICAL CAPABILITY CRITERION
TOTAL RESOURCE
TOTAL LOAD
MEGAWATTS
7,000
6,000
5,000
4,000
3,000
86 87 88 89 90 91 92 93 94 95 96 97 98 99 00 01
FISCAL YEAR ENDING MARCH 31

FIGURE II

ANNUAL REPORT

OF THE

RESEARCH AND DEVELOPMENT SUBCOMMITTEE

OF THE

COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

JANUARY 1986

Members:

J. A. Lea - Chairman, MECL

J. Kiuru, NSPC

C. T. Flynn, NB Power

0357B

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5.1 EXECUTIVE SUMMARY

This fifth annual report of the Research and Development Subcommittee of the Co-ordinating Committee of Maritime Electric Utilities (CCMEU) covers the Subcommittee's activities during 1985.

The Subcommittee is pleased to report a continual development in the R&D communications structure in all member utilities, enabling the dissemination of R&D information in an effective manner and providing co-ordination of each utility's internal R&D activities.

During 1985, the Subcommittee continued to carry out its mandate as set forth in its Terms of Reference (Section 5.3). A summary of the Subcommittee's achievements for 1985 is shown in Section 5.5 of this report.

The reports on the status of recently completed and on-going R&D projects in the Maritime Electric Utilities are summarized in Section 5.7. Pooling of resources and results are made whenever such activity will benefit the utilities in region.

The main areas of R&D in the region in 1985 related to the following:

(a) reduction in acid-forming gas emissions
(b) load research information
(c) preventive maintenance
(d) alternate fuels for oil-fired plants
(e) research into new energy markets.

5.2 INTRODUCTION

This is the fifth annual report of the Research and Development Subcommittee of the CCMEU which was formed in March 1982.

The summary of 1985 activities and the proposed activities for 1986 demonstrate a continuing increase and improvement in co-operative activity in which the benefits of R&D in the Maritime Electric Utilities are being shared among member utilities.

The contents of this report reflect the continued commitment by CCMEU and its member utilities to promote a regional approach to R&D within the Maritime Provinces.

5.3 TERMS OF REFERENCE

The Regional R&D Subcommittee shall consist of at least one member from each of the province-wide utilities in the Maritime region. The Subcommittee will meet at least twice yearly and will report to the Coordinating Committee of the Maritime Electric Utilities (CCMEU) at least twice yearly.

The regional R&D Subcommittee shall undertake the following:

5.3.1 Report on all electric utility-related R&D activities that are currently underway in the Maritime provinces.

5.3.2 Set up procedures whereby it is informed of any individual utility initiatives in R&D activity and attempt to achieve regional interest and participation in these activities.

5.3.3 Promote and implement the free exchange of R&D project information, procedures and results in order to share the results of all R&D projects undertaken by each utility. Recommend joint projects when such co-operation would benefit the region.

5.3.4 Review current and planned R&D expenditures by the member utilities and to recommend how maximum regional benefit can be obtained from these expenditures; this would include, but not be limited to the recommending against duplication of R&D effort.

5.3.5 Review the current and proposed R&D participation by member utilities in the CEA R&D program, and recommend actions which will enhance the regional benefit of these projects. This includes the possibility of joint proposals and joint bids on R&D contracts by member utilities.

5.3.6 Review R&D activity undertaken by utilities in Canada that is outside the umbrella of the Canadian Electrical Association and obtain the results of that activity for regional use.

5.3.7 Recommend to the CCMEU those R&D initiatives that the Subcommittee thinks should be taken within the region.

5.3.8 For projects which are identified by all member utilities to be of regional interest, but which cannot be funded by CEA or other R&D Funding, the Subcommittee shall request funding by the member utilities through the CCMEU.

5.3.9 Submit minutes of Subcommittee meetings to the Secretary of CCMEU for distribution to members of the CCMEU and its other Subcommittees.

5.3.10 Submit a proposed work program and an expected budget requirement annually to the CCMEU as directed.

5.4 WORK PLAN FOR 1985

5.4.1 To continue to investigate areas where joint participation in R&D projects is possible.

5.4.2 To continue to share results of individual R&D projects.

5.4.3 To continue to follow developments in coal beneficiation studies through the activities of the Committee on Atlantic Coal. The Subcommittee will continue to follow the work of this group in order to ensure that maximum regional benefits and involvement, particularly in the area of economics, are realized from the ongoing work.

5.4.4 To continue to interface with the Circulating Fluidized Bed Management Board in order to identify and promote relevant research which will involve and benefit the region.

5.4.5 To continue to update its survey of R&D activities being carried out by member utilities in accordance with its Terms of Reference.

5.4.6 To carry out a review of the funding level of utility-related R&D projects undertaken or initiated by the CCMEU and CEA within the region.

5.4.7 To carry out a review of utility-related R&D funding throughout Canada.

5.5 SUMMARY OF ACHIEVEMENTS - 1985

5.5.1 Regional Representation on CFB Management Board

Through the initiative of the R&D Subcommittee of the CCMEU, the circulating fluidized bed (CFB) Management Board continues to have regional representation. Board membership currently consists of N.B. Power, the Government of New Brunswick, Energy, Mines & Resources Canada and N.S. Power. The CFB Management Board provides overall guidance to the work and planning of the Chatham, N.B. CFB project, the N.S. Power 150 MW CFB feasibility study and the distributed-mixing burner at Chatham, N.B.

5.5.2 Coal Beneficiation

The Subcommittee has continued to follow and promote developments in coal beneficiation studies being carried out by the Committee on Atlantic Coal in order to ensure maximum regional benefits and involvement.

5.5.3 R&D Project Review

The Subcommittee has begun to develop a summary of the nature and funding levels of all utility-related R&D Projects undertaken or initiated within the region. This project is underway with completion scheduled in 1986.

5.5.4 Update of Regional R&D Activity Report

The Subcommittee continued to update its survey of R&D activities within the region in accordance with its terms of reference. The latest results are contained in Section 5.7 of this report.

5.6 PROPOSED ACTIVITIES FOR 1986

5.6.1 To continue to investigate areas where joint participation in R&D projects is possible.

5.6.2 To complete a review of the funding level of utility-related R&D projects undertaken or initiated within the region.

5.6.3 To carry out a review of utility-related R&D funding throughout Canada.

5.6.4 To compile a list of suggested priorities of utility-related R&D projects within the region.

5.6.5 To continue to share results of individual R&D projects.

5.6.6 To continue to follow developments in coal beneficiation studies through the activities of the Committee on Atlantic Coal. The Subcommittee will continue to follow the work of this group in order to ensure that maximum regional benefits and involvement, particularly in the area of economics, are realized from the ongoing work.

5.6.7 To continue to interface with the Circulating Fluidized Bed technology developments in order to identify and promote relevant research which will involve and benefit the region.

5.6.8 To continue to update its survey of R&D activities being carried out by member utilities in accordance with its Terms of Reference.

5.7 STATUS OF CURRENT AND COMPLETED R&D ACTIVITIES IN THE MARITIME ELECTRIC UTILITIES

5.7.1 New Brunswick Electric Power Commission R&D Projects

5.7.1.1 Circulating Fluidized Bed Demonstration Project

Objective: To demonstrate this technology on a utility system utilizing locally-available fossil fuels. The initial test period, which utilizes Maritime fuels and sorbents, is scheduled to be completed by March 1988. Following this, the facility will be available to perform tests on other fuels and sorbents. It is anticipated that the facility will attract interest from other Canadian and international parties, from which further test programs will develop.

Description: This project includes the construction of a new circulating fluidized bed at NB Power's Chatham generating station which will be integrated with the existing 22 MW unit #2 turbine-generator. Following construction, the unit will be used to demonstrate the co-combustion of New Brunswick high sulphur coal and low-grade oil shales with locally-available limestone. The technology promises at least 90% sulfur capture during the combustion process thus enabling compliance with the new source performance guidelines of the Federal government.

Status: The CFB project is under construction and commissioning is scheduled in the summer of 1986. The R&D test program will commence at that time and run until March 31, 1988.

Cost: $33,000,000

Funding: Energy Mines and Resources Canada

Contact: C. Flynn, NB Power
506-458-4259

5.7.1.2 Distributed-Mixing Coal Burner Development

Objective: To demonstrate this technology on a 1 MMBTU/hr test rig with New Brunswick and Nova Scotia coals, limestone and oil shales.

Description: Distributed-mixing combustion of solid fuels has been developed in the U.S. and elsewhere as a means of retrofitting existing coal-fired boilers to reduce emissions of nitrogen oxides by as much as 50%. The present projects will evaluate this aspect of the technique with local fuels and additionally assess the effect of concurrent injection of sulfur-absorbing constituents such as limestone for partial SO_2 emission reduction.

Status: The test rig is currently being commissioned with the test program scheduled to be complete by August 1986.

Cost: $800,000

Funding: Energy, Mines & Resources Canada

Contact: C. Flynn, NB Power
506-458-4259

5.7.1.3 Chatham Coal-Water Mixture Demonstration

Objective: To determine the practicality of burning coal-water mixtures as a direct replacement for heavy fuel oil.

Description: This is a joint project of the Federal Department of Energy, Mines and Resources, Cape Breton Development Corporation and NB Power. CBDC is responsible for the preparation of the low ash, low sulphur slurry. NB Power has burned approximately 5,000 tonnes of this coal-water fuel (CWF) in its Chatham #1 and #2 Units. The fuel contains approximately 70% coal, 29% water and 1% additives, with no oil content.

Results of this program have proven that CWF of the correct specification can be burned successfully without the need for support fuel.

Problems which require further work include improving quality control of CWF preparation as well as further improvement in the burners and atomizers.

This has resulted in new development projects with both coal-water fuels and atomizers.

Status: The original project has been complete and a full set of reports was issued in early 1985.

Cost: $7,150,000

Funding: 100% Energy, Mines and Resources Canada

Contact: D. M. Rankin, NB Power
506-458-4275

5.7.1.4 OX-CE Fuel Demonstration at the Chatham Generating Station

Object: To evaluate the performance of coal-water fuel burners that have been installed in boilers 1 & 2 at the Chatham Plant using the commercially-available OX-CE fuel and comparing the results with those obtained earlier while using a coal-water fuel supplied by CBDC.

Description: This is a joint project of Energy, Mines and Resources Canada and NB Power.

The OX-CE Fuel Company whose coal-water fuel processing plant is located in Jacksonville, Florida agreed to provide 510 tons of fuel for the test free of charge, with the project accountable for absorbing the cost of transportation.

Some fuel instability problems were experienced; but fuel was rehabilitated at the Chatham Plant to the point where it could be burned very successfully.

Status: Test results are being assessed and a final report is scheduled to be ready in March 1986.

Cost: The project budget is $200,000.00.

Funding: 100% funded by Energy, Mines and Resources Canada.

Contact: D. M. Rankin, NB Power, 506-458-4275

5.7.1.5 NRC Atomizer Demonstration at the Chatham Generating Station

Objective: To prove NRC coal-water fuel atomizers on Chatham No. 1 boiler at the 40 million BTU/h level.

Description: This is a project of Energy, Mines and Resources Canada and NB Power.

Results to date prove that the NRC-design atomizer provides good atomization and a stable flame.

The success of the tests to date has encouraged Energy, Mines and Resources to consider increasing the scope of test work to be done under this contract.

Status: NRC has scaled up their burner/atomizer and a test will be conducted in February 1986 in conjunction with a baghouse test on Chatham Unit No. 1.

Cost: The project budget is $495,700.00.

Funding: 100% funded by Energy, Mines and Resources Canada.

Contact: D. M. Rankin, NB Power
506-458-4275

5.7.1.6 Leak Detection in Feedwater Heaters

Objective: Early detection of leaks in feedwater heaters using ultrasonic techniques.

Description: This project was carried out by RPC at the Grand Lake generating station.

Reference holes were punched in a sample heat exchanger and the frequency of the leak was monitored. A suitable detector was identified to pick up the specific frequency.

A demonstration of this technique is being considered as a project to take place in 1986.

Status: Complete

Cost: $87,000

Funding: CEA R&D

Contact: G. J. Ross, NB Power
506-458-3019

5.7.1.7 Coal Wash Project

Objective: The object of this project is to provide an order-of-magnitude cost of constructing a coal wash plant and its impact on the cost of operation, and secondly to carry out a pilot test of washing Minto coal at EMR's Devon Research Facilities and to assess the effect on combustion.

Description: This is a joint undertaking by EMR Canada and NB Power. A study on the economics of constructing coal washing facilities and the assessment of operating costs was carried out.

A sample of Minto coal taken from the No. 8200 seam was sent to EMR's Devon Research Facilities where the coal was washed and assessed at various levels of thermal recovery.

The washed samples were then transported to EMR's Combustion Laboratory at Bell's Corner, Ottawa for combustion tests.

Status: The combustion tests have recently been conducted and results are being assessed by EMR scientists.

Funding: Energy, Mines and Resources Canada and NB Power.

Contact: D. M. Rankin, NB Power, 506-458-4275

5.7.1.8 Development of an On-Line Performance Monitoring System

Objective: To develop a real-time unit performance monitoring system on a coal-fired generating unit to provide diagnostic capabilities information on plant efficiency.

Description: The system is a microprocessor-based data collection and analysis unit which accesses the plant operating data and provides feedback to operations personnel on operating problems and the impact of design conditions. Analysis of certain areas of the cycle is provided to aid operator actions.

Status: Initiated January 1985, completion December 1986.

Funding: Joint Venture Project with EM&R, Canadian Applied Technology and NB Power.

Contact: R. Pickles, NB Power
506-458-3049

5.7.1.9 Retrofit Variable-Speed Drive to an Induced-Draft Fan

Objective: To retrofit and evaluate the addition of 600-volt drive system to 4160-volt application.

Description: The existing induced-draft fan at the Chatham Coal/Oil Shale Demonstration project is powered at 4160 volts. This project will provide an alternate feed to that motor through a standard 600-volt variable-speed drive using input and output transformers.

The study aspects of the project will concentrate on harmonic effects and efficiency.

Status: Equipment is being purchased. Testing to begin in third quarter of 1986.

Cost: $175,000

Funding: 100% CEA

Contact: A. Gunn, NB Power, 506-458-4230

5.7.1.10 Electrical Testing of Thermally-Deteriorated Converter Transformers to Determine Remaining Electrical Strength

Objective: To evaluate the reduction in power transformer life as a result of continuous long-time overloading.

Description: Since 1983, NB Power has been involved in a change-out program of the converter transformers at the Eel River HVDC station following the failure of one unit.

During repair caused by the fault, thermal degradation to both the valve and high-voltage windings was observed even though the units had been in operation for only twelve years with a continuous overload of 10%.

In conjunction with CGE, specified tests will be carried out on one unit to determine the electrical integrity. The results will supplement the existing information on overloading of power transformers and quantify the resultant loss of life in terms of operation above rated load.

Status: To be complete Spring 1986

Cost: $30,000

Funding: CEA - first $15,000/balance by NBEPC

Contact: M. N. Campbell, P. Eng., NB Power, 506-458-4220

5.7.1.11 Lightning Ground Fault Density Measurements in Canada

Objective: To conduct ground fault density measurements in Canada.

Description: Many countries in the world have conducted extensive lightning ground fault density measurements and built up data banks to aid in the design of lightning protection. This project will undertake to perform a similar function across Canada using the CIGRE 10 kHz vertical aerial counter. NB Power is participating with CEA by setting up and monitoring the test sites in New Brunswick and providing a member of the Task Force guiding the project.

The results will more accurately define the isokeraunic levels across Canada and provide the basis for design parameters which could result in reduced transmission line costs without any loss in reliability.

Status: Monitors to be installed in NB during 1986.

Cost: Total project $350,000
NB Power Share $10,500

Funding: CEA (179 T 382)

Contact: D. E. Clark, P. Eng., NB Power, 506-458-4085

5.7.1.12 Review of Current and Scheduled Research and Development in HVDC - Position Paper

Objective: To determine all the current and proposed HVDC research and development on an international basis.

Description: All known R&D work done in Canada, U.S. and internationally was reviewed to determine what has been done and what is planned. The position paper formed the basis for recommending further research by CEA in HVDC. An NB Power representative has just become the Chairman of the Working Group of technical experts who recommend the HVDC research program to the CEA R&D Transmission Committee.

Status: Complete

Cost: $5,000

Funding: CEA

Contact: Ting Lee, P. Eng., NB Power
506-458-3245

5.7.1.13 Seminar on Transmission Line Audible Noise

Objective: To develop a practical understanding of audible noise caused by the operation of transmission lines and to determine a practical limit of acceptable noise levels.

Description: NB Power in conjunction with Ontario Hydro and CEA E&O planned and organized the seminar in Quebec City which saw the bringing together of experts in a panel discussion for the purpose of arriving at a practical understanding of all aspects of audible noise associated with the operation of transmission lines. The resulting discussion aimed at forming the basis for the establishment of practical limits of acceptable noise levels. The final report, edited by the NB Power has been published by CEA R&D.

Status: Complete

Cost: $2,000

Funding: CEA R&D for the publishing of reports

Contact: R. E. Haggerty, P. Eng., NB Power
506-458-4302

5.7.1.14 State-of-the-Art Study on Electron and Particle Beam Devices

Objective: To summarize the present world-wide and Canadian state-of-the-art on Electron and Particle Beam devices, their present and future applications and provide an assessment of their impact on future electrical energy demands.

Description: A state-of-the-art survey has been conducted concerning world-wide utilization of accelerated beams of electrons and ions. The use of particle-beam accelerators has grown at a very rapid pace because of the availability of reliable high-powered equipment, the reduction they provide in production costs and their use for the production of new and improved products. A number of opportunities for improving the competitiveness of Canadian industries has been identified along with recommendations for future demonstration plants.

The chief industrial applications include the very rapid and efficient curing of coatings on paper, film, wood, metal, plastic, cardboard; the cross-linking of a variety of chemicals to produce improved and unique heat shrinkable connectors and packaging materials (such as Cryovac) and improved wire and cable insulation. High-intensity beams of electrons have been used to treat sewage sludge, waste water, flue gases, various foods, wood chips, wood and other polymer composites, medical supplies and for disinfestation of grain. Ion beams are being used to create improved semi-conductor materials and circuitry and, at higher particle fluxes, to change material surface characteristics such as hardness and resistance to wear, friction, corrosion and erosion.

Status: 100% complete. Final report has recently been submitted to CEA for production.

Cost: $24,000

Funding: 100% Canadian Electrical Association R&D Division (CEA Report 412U513).

Contact: R. Little, NB Power
506-458-4293

5.7.1.15 Power System Harmonics - A Review and Assessment of Problems

Objective: The purpose of this study is to recommend a course of action for CEA to follow to assist utilities to come to terms with the power system harmonics issue.

Description: A considerable amount of research work has been done by CEA and other groups to investigate problems associated with Power System Harmonics. Most Canadian utilities enforce a general requirement that their customers not operate harmonic-frequency generating equipment which adversely affects other customers. However, the acceptable limits and standards are not well defined. Detection and measurement of disturbing harmonics is also difficult. In most cases the onus is left with the affected customer to identify the problem and register a complaint.

The project will review the existing work done and analyze the need for further work from the viewpoint of customer utilization and the effects of disturbance both on the customer and the utility. Specific questions to be answered include:

- What are major customer utilization concerns and effects of disturbing harmonics?
- What amount of customer complaints and damage is resulting?
- Is there a need for a utility standards stating acceptable levels of power system harmonics?
- How can the concerns and requirements best be met?

Status: This Canadian Electrical Association Project has been awarded to the University of New Brunswick and work is on-going at present.

Cost: $47,541

Funding: 100% Canadian Electrical Association, R&D Division (CEA 415U474).

Contacts: R. Little, NB Power
506-485-4293

5.7.1.16 Survey of Canadian Electrical Inspection Authorities Re: Service Entrance Upgrading Practices

Objective: To survey all the Canadian Electrical Inspection authorities to obtain their opinions and ruling on the acceptability of the proposed modification techniques of CEA Project 334USOA - Upgrading Residential Service Entrance.

Description: CEA Project 334USOA outlined several economical upgrading methods which could be used to effectively permit an increased load on existing electrical entrance panels. Traditional methods of upgrading normally meant replacing everything, which was a very costly proposition.

Status: This Canadian Electrical Association Project has recently been awarded to Neill and Gunter of Fredericton, NB with a scheduled completion of June, 1986.

Cost: $10,500

Funding: 100% Canadian Electrical Association, R&D Division (CEA 444UATS).

Contacts: R. Little, NB Power
506-485-4293

5.7.1.17 High-Temperature Industrial Heat Pump Laboratory

Objective: To conduct a feasibility study on the economics, effectiveness and application of such facility in Canada.

Description: This Canadian Electric Association (CEA) study will be conducted over a three-month period and will consider the following:

a) feasibility and effectiveness of the laboratory
b) potential clients and usage of laboratory and its results
c) funding requirements for the laboratory
d) expected funding sources for the laboratory
e) expected benefits/costs of such a laboratory

Status: This contract has been awarded in January of 1986 to Neill and Gunter Consultants of Fredericton with a scheduled completion of June, 1986.

Cost: $19,950

Funding: 100% Canadian Electrical Association R&D Division (CEA 525U536).

Contact: R. Little, NB Power
506-458-4293

5.7.1.18 Fish Culture Facility Utilizing Waste Heat From the Mactaquac Generating Station

Objective: To reduce the cost of raising young salmon by accelerating their growth in warm water from a hydro plant.

Description: Hatchery-raised salmon normally take two years to mature. In warm water this maturation period can be reduced to one year. This doubles production since a hatchery can produce a crop each year rather than every second year. It also reduces production cost by almost one half.

NB Power and Fisheries and Oceans Canada have developed this technology using warm water from hydro plant stator and generator cooling systems.

A successful pilot project carried out in 1982 at the Mactaquac Hydro plant has led to a large, 2-million-salmon-per-year production facility.

The project is unique, being the only production hatchery in the world using warm water from a hydro plant.

The facility has become a key component in a plan to enhance the salmon resource on the Saint John River.

Status: The R&D portion of the project has been completed. The facility is now operated by the Department of Fisheries in a production mode of 2,000,000 salmon per year.

Cost: $1,000,000

Funding: Project was funded by Fisheries and Oceans Canada and NB Power.

Contact: J. Mercer, NB Power
506-458-3452

5.7.1.19 Fish Passage Facilities

Objective: To undertake a comprehensive and up-to-date evaluation of upstream fish passage facilities, to be used for the preparation of a manual of such facilities for use by utility engineers, biologists and planners.

Description: This contract was awarded to Washburn & Gillis.

The project involved the compilation of data obtained through research of literature and responses to a questionnaire sent across Canada and the U.S. Over 800 facilities were inventoried.

Workshops were held in Halifax and Vancouver with invited attendees with experience in fishway design.

Status: Complete

Cost: $130,00

Funding: CEA R&D

Contact: F. Meth, NB Power
506-458-3266

5.7.1.20 Utilization of Thermal Station Cooling Water for Hatchery Aquaculture

Objective: To determine the full potential for use of warm water in salmon and trout culture during incubation, hatching and early rearing.

Description: This project was established at Grand Lake plant to more fully determine potentials for hatchery aquaculture. This project demonstrates the economic and biological feasibility of utilizing condenser cooling water for year-round fish culture activities.

Status: Completed March 1985

Cost: $133,000

Funding: Jointly funded under CEA Project #006U192 by CEA, NB Power, Department of Natural Resources, NB Coal, NB Energy Secretariat, EMR Canada, NB Wildlife Federation and Fisheries and Oceans Canada.

Contact: J. Mercer, NB Power
506-458-3452

5.7.1.21 Waste Heat Utilization - Surface-Heated [illegible]house

Objective: To evaluate a unique application of power station cooling water to reduce heating costs of conventional greenhouses.

Description: This heating concept involves the distribution of a thin layer of water over the roof surface thereby creating a reduced temperature gradient

between the inside and apparent outside temperatures. The water layer can be up to 75°F warmer than ambient air temperatures during winter months.

Results of a one year study showed energy savings of between 30-70% achievable with a heated greenhouse with no deleterious effects. Water temperature primarily determined the savings.

Status: Complete. Final report has been submitted to CEA for review.

Cost: $950,000

Funding: CEA, Energy, Mines and Resources Canada, NB Energy Secretariat, NB Coal, NB Power

Contact: J. Mercer, NB Power
506-458-3452

5.7.2 Nova Scotia Power Corporation R&D Projects

5.7.2.1 Accelerated Material Evaluation of Polymer Insulators for Transmission Lines

Objective: To evaluate the effect of pollution on polymer insulators in a salt fog environment.

Description: NSPC is participating in this CEA R&D Project undertaken by IREQ (Hydro-Quebec). Six polymer insulators of three makes, Ohio Brass Hi-Lite, Ceraver Armourlite and Rosenthal Roderflex were installed hot by NSPC on L7011 in the Lingan area in November 1982. One unit of each make was equipped with a corona ring.

Status: Inspected June 1984 and summer 1985. Removal date has been deferred from June 1984 to May 1986 to provide more useful information. A final report is expected before end of 1986.

Cost: $229,230

Funding: Canadian Electrical Association (R&D Project No. 121-T-226).

Contact: Wayne Chappell (NSPC).

5.7.2.2 Annapolis Tidal Project

Description: The pilot project of building a tidal power plant at Annapolis was undertaken by the Tidal Power Corporation (TPC). TPC engaged NSPC to design, construct and operate the tidal power plant. The project employs the largest Stra-flo turbine ever built, a type that is being considered for possible future installations in the Bay of Fundy. Annapolis is a demonstration project to gather data that could be used in the design of future tidal or low-head river installations. It is remote-controlled from the NSPC power control centre at Milton. The output at rated head is 17.8 MWe and the runner diameter is 7.6 m.

Status: The plant was committed for construction early in 1980 and passed its commercial acceptance tests on August 11, 1984. It was in excellent condition at its first annual inspection June 1985. First year availability has been 98%. The unit is now an operational part of the NSPC system having been purchased by NSPC effective 1984 08 11.

Contact: L.R. Feetham (NSPC).

5.7.2.3 Atmospheric Fluidized Bed Studies

Objective: To build an atmospheric fluidized bed combustor and to conduct a 10,000-hour test program which is intended to investigate the corrosion/erosion characteristics of in-bed and convection-pass tube materials.

Description: NSPC is managing the project which includes the design, construction, commissioning and operation of the test rig with a bed size of 1 m x 1 m. The in-bed and convection pass tubes are either water-cooled, air-cooled or uncooled. The rig generates no steam. Combustion Engineering Canada Limited was involved in the construction of the rig proper, while NSPC is responsible for the balance of the project.

Status: The test program was completed end of September 1985. Reporting will continue until project termination in Spring 1986.

Cost: Final cost is projected to be slightly less than $8 million for all aspects of the program.

Funding: Energy, Mines and Resources Canada.

Contact: N. W. Andrews (NSPC).

5.7.2.4 Circulating Fluidized Bed (CFB) Feasibility Study

Objective: To study the feasibility of circulating fluidized bed boilers for Utility application in the 150 MWe size range. Specifically, instrumentation and control systems will be investigated to prove safe start-up, load-following, and flexibility capabilities of

the system. Additionally, studies on feedstock preparation and injection, dust collection, and waste disposal will be conducted.

Description: NSPC is managing the study, under the general guidance of the CFB Management Board. An assessment of the capabilities of various manufacturers to build CFB's sized at 150 MWe will be examined. The Pt. Tupper Generating Station will be used in developing technological scheduling and costing details.

Cost: $500,000 has been appropriated for salaries and expenses associated with the study.

Funding: Financial support will be provided through the offices of the Oil Substitution Committee.

Contact: N. W. Andrews (NSPC).

5.7.2.5 Coal-Liquid Mixtures

Description: As part of the Federally-funded ($8.8 million) coal-water fuel demonstration program currently underway and centred on a combustion demonstration on the No. 10 Unit of Maritime Electric's Charlottetown, PEI Generating Station, NSPC are to undertake a paper study to evaluate the technical and economic problems/benefits of converting the 100 MW - No. 2 Unit at Tuft's Cove to coal-water fuel.

Status: Study began in 1985.

Contact: A. J. Neale (NSPC).

5.7.2.6 Control of Distribution Line Galloping

(CEA Project No. 196 D 367, awarded to Ontario Hydro).

Objective: To obtain reliable observations of performance of promising control devices during galloping occurrences.

Description: NSPC are co-operating in this project. Two galloping-control devices, the air-flow spoiler and the detuning pendulum have been installed on a six-span section of line in the Cheticamp area. Eighteen air-flow spoilers, three per span, and six detuning pendulums, one per span, were installed on different phases. The remaining phase with no devices installed will be used as a reference. These tests will determine the overall effectiveness of the control devices under natural galloping conditions. Interphase spacers were installed on four other spans along the same section of line in 1985.

The results will provide recommendations on the application of these devices to eliminate or reduce the effects of galloping on existing and new distribution lines.

Status: Commenced in 1984, extended to monitor galloping conditions in the 1985-86 winter season.

Funding: Material and monitoring equipment provided by Ontario Hydro under CEA contract. Control devices installed and monitored by NSPC.

Contact: K. S. Mathur (NSPC).

5.7.2.7 Development of a One-Ton Line Service Truck Body

Description: In 1983, the Atlantic Utilities reached consensus on a standard one-ton line service body, including basic modular, overall length, width, height, compartment size and layout and options.

General construction drawings and specifications were completed in 1984. The Atlantic Utility Managers requested that a further report be prepared on availability, cost and economics of aluminum and fiberglass bodies versus steel.

Status: This project was completed in July 1985.

Funding: In-house co-operative project by the Atlantic Utilities.

Contact: J. F. Baird (NSPC).

5.7.2.8 Feasibility Evaluation of Large-Scale Heat Pumps

Description: Caneur Limited and the N.S. Department of Development are evaluating the application of large-scale (4-10 MW) heat pumps in the Canadian environment. Six potential applications have been detailed to enable the feasibility of this equipment to be evaluated for typical applications. The general profiling of potential sites has been completed by the NSPC Thermal Production Engineering Department. A summary report has been submitted to Caneur Limited and the Nova Scotia Department of Development for further study.

Contact: I. D. Covill (NSPC).

5.7.2.9 Field Testing of Distribution Equipment and Line Materials in a Marine Atmosphere

Objective: To evaluate corrosion of equipment in a marine atmosphere.

Description: A 25 kV line along Inverness Beach feeding summer cottages has been fitted with various components such as cutouts, lightning arrestors, epoxy arms, insulators, connectors, clamps, etc., to study the effect of salt contamination under normal operating conditions. This experience will assist in the evaluation and selection of suitable materials for construction of distribution lines in sea coast areas.

Thirty-three powder-coated distribution transformers have been purchased with a polyester finish. They are being installed in salt and industrial-polluted areas in Eastern and Western Zones. Three additional powder coated transformers were installed in the Peggy's Cove - Prospect area as part of CEA R&D Project 78-94 awarded to BC Hydro.

Status: Commenced 1983 (On going).

Funding: NSPC in-house project.

Contact: K. S. Mathur (NSPC).

5.7.2.10 Marginal Cost-Based Peak Load Pricing and Load Control Study

Objective: To ascertain whether certain pricing and load control systems can, in fact, lead to more efficient utilization of NSPC's capital and energy resources at a net benefit to its customers and the Corporation;

- To investigate the theoretical background and applicability of marginal cost pricing concepts; and;

- To develop, in the process, modeling techniques for load and sales forecasting, as well as system and financial planning.

Description: The study deals with many subsidiary issues which are critical to the achievement of the objectives. Among these will be the cost effectiveness of metering and load control systems, sample selection techniques, corporate operating procedures, administrative feasibility of alternative rate designs and data collection software system design.

Status: The project was started in April 1979 with initial studies relating to cost of service, cost allocation, marginal cost, and load and sales forecasting, conducted with the assistance of consultants.

Equipment installation was essentially completed in 1985 and computerized collection of metering data from approximately 800 sites throughout the province covering all classes of service has been in progress for a considerable time. Information on kW.h and Q.h are recorded at 15-minute intervals. The data is collected by computer using the dial telephone system to call each collector every 2-5 days. The Maritime Telegraph and Telephone Company is co-operating with NSPC in this experiment.

A one-year load management experiment involving 50 domestic water heaters went into operation July 1985.

The final project modules including a Time of Use Feasibility Study, Cost Benefit Study and Final reports are scheduled for completion in December 1986.

Cost: $3,225,000 for equipment and external consulting. NSPC manhours not included in cost.

Funding: Total of $3,225,000 funded 80% by Federal government and 20% by Province of Nova Scotia. Additional funding of $175,000 by the Oil Substitution and Conservation Agreement under EM&R has been obtained to complete the project.

Contact: Jack Kiuru (NSPC).

5.7.2.11 Osprey Nesting on Transmission Lines

Objective: To extend previous research in osprey nest relocation.

Description: Criteria for the relocation of osprey nests have been tested during two field seasons at six sites in Nova Scotia. The relocation structures have been 100% successful in attracting osprey away from transmission pole structures. The second field season has been used to verify the preliminary results and to study osprey population dynamics.

Status: Commenced October 1983, Final Report issued January 1986. (CEA Report No. 225 T 407)

Funding:		
	N.S. Power Corporation	$11,353
	N.S. Department of Lands & Forests	24,332
	St. Francis Xavier University	16,910
	CEA	18,490

Contact: T. P. Toner, Environmental Specialist (NSPC).

5.7.2.12 Performance of Preservative-Treated White and Red Spruce Poles: Examination for Checking Toughness (CEA R&D Project 77-29A, awarded to Forinteck)

Description: Approximately 144 ACA-treated spruce poles have been installed in the Guysborough Area (Dickie Brook line). These poles were cut in 1977-78 from Hants County, Nova Scotia. Incisions were made along the full length of the poles and full-cell treatment of ACA product was applied in accordance with CSA Standard O-80. The penetration depth averaged to 1.10 inches.

Examination of the poles carried out in 1981 showed incised poles as moderately checking and non-incised poles as severely checking. Hardware removed from some poles in 1984 showed signs of corrosion.

A common complaint from the linemen was the hardness of the poles and vertical splits making them difficult to climb.

Status: Commenced in 1980, poles were inspected in 1981 and 1984 by Forinteck.

Funding: Poles and installation funded by NSPC. Inspection and report funded by CEA R&D.

Contact: K. S. Mathur (NSPC).

5.7.2.13 Wind Generation Experiment

Description: A wind turbine was placed in service at South Lake, near the Wreck Cove Hydro Development in 1981. The intent was to generate energy equivalent to that required to pump additional water into the Wreck Cove head pond. Initial problems characterized by wide power swings were corrected by replacing the synchronous generator with an induction generator. Further problems with the micro-processor control unit and with cracks in one of the blade spars delayed the final commissioning of the unit. The manufacturer has supplied diagonal braces for installation between the blades. These have been installed and the unit is now generating on a part-time basis. Further modifications may be required to the cracked spar if additional deterioration takes place. Modifications to the micro-processor have been made and the unit is now performing very satisfactorily.

Contact: L. R. Feetham (NSPC)

5.7.2.14 Application of Ion Chromatography To Chemical Control of the Steam/Water Cycle (CEA Project 535 G 535 awarded to N.S. Power Corp.)

Description: The importance of high purity feedwater for maintaining the integrity of components of high pressure steam plant has long been recognized. Present standards in terms of 1 ppb are amenable to instrumentation such as sodium ion analyzers and cation conductivity. These are effective only with specialist support staff on hand. The ion chromatograph overcomes the analytical problems in measuring low levels of sulphate and chloride. On-line instrumentation has been developed and is

currently under evaluation. This project will seek to adapt a low-cost ion chromatograph for on-line use in high pressure thermal plant analytical systems.

Status: Initiated September 1985, scheduled completion November 1986.

Funding:	CEA R&D	$40,000
	Co Funding	40,000
Total		$80,000

Contact: A. J. Farmer (NSPC) Project Leader.

5.7.2.15 Nova Scotia Add-On Plenum Heater Experiment

Description: The experiment will include 200 single and multi-unit residential and other buildings located throughout the province. Add-on plenum heaters will be installed at no cost to the homeowner, and monitored for a one-year period. Control will be provided by approximately 100 similar homes with no change to the heating system.

Status: Project is scheduled to commence in December 1985 and be completed in 1987.

Funding: Funding of $1,025,000 provided by the Oil Substitution and Conservation Agreement.

Contact: Jim Kirby (NSPC).

5.7.3 Maritime Electric Company, Limited R&D Projects

5.7.3.1 Wind Test Site - North Cape, P.E.I.

Description: This is a national facility available to Government and private industry for field testing of windmills. Laboratory facilities provide data acquisition for the determination of unit performance.

Status: In operation

Funding: Site is operated by Resource Ventures Ltd. under long-term contract from the P.E.I. government with an annual operating grant from N.R.C.

MECL Involvement - MECL has agreed to purchase output on an "energy displacement" basis. MECL also provides technical assistance on an 'as required' basis.

Contact: J. A. Lea (MECL)

5.7.3.2 Coal-Liquid Mixture Combustion - Charlottetown, P.E.I.

Objective: To determine the practicality of burning coal-water mixtures as a direct replacement for heavy fuel oil.

Description: This project is designed to investigate the practicality and effectiveness of burning a Carbogel (coal-water) mixture in a utility boiler originally designed to burn oil. The project will also demonstrate the feasibility of production and delivery of Carbogel in sufficient quantities for combustion. Further information to be gained from the project includes:

- transportation, storage and handling of Carbogel
- modification to oil-fired boilers
- design of coal-water burners
- combustion efficiency
- economic data

Status: Project 10% complete. Scheduled for completion early in 1987.

Cost: $8.8 million

Funding: Energy, Mines & Resources Canada

Contact: J. L. Boomhower, MECL

5.7.3.3 Farm Losses Resulting From Electric Service Interruptions

Objective: To obtain an evaluation of the direct and short term costs incurred on farms as a result of local random supply interruptions.

Description - This project (CEA Project 309 U 403) is being carried out by the University of Saskatchewan and involves the selection of a representative sample of farmers across PEI and forwarding a questionnaire to them.

Electrical consumption and cost for farms was also forwarded after approval was received.

Cost: $5,000.

Funding: Maritime Electric Company, Limited

Status: Awaiting report.

Contact: K. M. Montgomery

5.7.3.4 Transmission Conductor Galloping

Objectives: To determine the performance of alternate methods of controlling tranmission line galloping.

Description: Two galloping-control devices, air-flow spoilers and detuning pendulums have been installed on selected spans of a 138 kV transmission line that have experienced galloping. Tests and observations will compare performance of each product with the performance of the spans prior to installation.

Status: Installation was completed in December 1985.

Funding: Total cost - $15,000

Preformed spoilers provided by Preformed Line Products, Limited. All other costs funded by Maritime Electric Company, Limited.

Contacts: J. Gaudet (MECL)